SECTION 165330-FIRE PROTECTION SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.
B. Refer to the cover sheet Drawing A0.0 for Building Code Summary and Fire Sprinkler Code requirements. Verify and obtain approval from local Fire Marshal and authority having jurisdiction.

1.02 SUMMARY

A. This Section specifies wet-pipe sprinkler systems for building and structures that are maintained above 40° F, and Dry system for all areas that are not maintained above 40°F. Antifreeze or glycol systems will not be allowed. All patios, porte-cocheres and canopies are to be sprinkled with the dry system and dry pendent heads when required by local authority having jurisdiction.

1. NOTE: System testing shall be witnessed by the Fire Marshal.

1.03 DEFINITIONS

A. Pipe sizes used in this Section are nominal pipe size (NPS) specified in inches. Tube sizes are standard tube size specified in inches.

B. Working plans as used in this Section refer to documents (including drawings and calculations) prepared pursuant to requirements in NFPA 13 for obtaining approval of authority having jurisdiction.

C. Other definitions for fire protection systems are included in referenced NFPA standards.

1.04 SYSTEM DESCRIPTION

A. Wet-pipe Sprinkler-System: System with automatic sprinklers attached to piping system containing water and connected to water supply so that water discharges immediately from sprinklers when they are opened by fire. Use dry-type sprinklers subject to freezing. Provide shutoff valves and flow switches on each floor as required by authority having jurisdiction.

B. Dry-pipe Sprinkler System: System with automatic sprinklers attached to piping system containing air connected to water supply so that water discharges immediately from sprinklers when they are opened by fire.

1. All piping for dry system shall be galvanized pipe.

2. Dry Pipe Valve: Differential type. Provide with all trim as recommended by the manufacturer for variable pressure service, including air maintenance for variable pressure service, including air maintenance device, electric low pressure gauges. Provide accelerator when system volume exceeds 500 gallons. Provide tank mounted air compressor with tank, sized per NFPA 13.

3. All drum drips are to be run down to the first floor. All drum drips will have a 1" ball valve installed. They must be easily accessible with valves at 6'-6" to 4'-6" above finished floor and must discharge one foot above ground level and drain outside. Under no circumstance can the valves be ran in any apartments, or terminate inside the building.

C. Sprinkler System Protection Limits: By local authority having jurisdiction.

1.05 SYSTEM PERFORMANCE REQUIREMENTS

A. Design (by a professional fire prevention engineer) and obtain approval from authority having jurisdiction for fire protection systems specified.

B. Minimum Pipe Sizes: Not smaller than sizes indicated for connection to water supply piping, standpipes and branches from standpipes and branch from standpipes to sprinklers.

C. Conduct fire hydrant flow tests as required to obtain hydraulic data needed to prepare design for hydraulically calculated systems.

D. Hydraulically design sprinkler systems according to:

1. Sprinkler System Occupancy Hazard Classifications: As follows:
   a. Office and Public Areas: Light hazard.
   b. Storage Area. Ordinary hazard.
   c. Equipment Rooms: Ordinary hazard.
   d. Service Areas: Ordinary hazard.
   e. Residential Units: Light hazard.

2. Minimum Density Requirements for Automatic Sprinkler System Hydraulic Design: As follows:
   a. Light Hazard Occupancy: 0.10 GPM over 1500 sq. ft. area.
   b. Ordinary Hazard, Group 1 Occupancy: 0.15 GPM over 1500 sq. ft. area.
   c. Ordinary Hazard, Group 2 Occupancy: 0.20 GPM over 1500 sq. ft. area.

3. Maximum Sprinkler Spacing: As follows:
   a. Office Space: 120 sq. ft./sprinkler.
   b. Storage Areas: 130 sq. ft./sprinkler.
   c. Mechanical Equipment Rooms: 130 sq. ft./sprinkler.
   d. Electrical Equipment Rooms: 130 sq. ft./sprinkler.
   e. Residential Units: 225 sq. ft./with quick response sprinklers.
   f. Other areas: where specified, or not, must be in accordance with NFPA 13, or sprinkler head manufacturer specifications and or local authority having jurisdiction.

E. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise:

1. Sprinkler System: 175 psig.

1.06 SUBMITTALS

A. Product data for fire protection system components. Including the following:

1. Back flow preventers.
2. Valves.
3. Specialty valves, accessories and devices.
4. Alarm devices. Include electrical data.
5. Fire department connections. Include type of fire department connection number, size type and arrangement of inlets, size and direction of outlet and finish.
6. Excess pressure pumps. Include electrical data.
7. Sprinklers, escutcheons and guards. Include sprinkler flow characteristics, mounting, finish and other data.

B. Sprinkler system drawings identified as "working plans" prepared according to NFPA 13. Submit required number of sets to authority having jurisdiction for review, comment and approval. Include system hydraulic calculations where applicable. After approval from AHJ send the approved sets to the Architect and General Construction for Owner approval. No pipe shall be hung until AHJ, Architect and Owner have reviewed and approved plans.

C. Sprinkler system drawings, identified as "working plans": and prepared according to NFPA 13, that have been approved by authority having jurisdiction. Include system hydraulic calculations where applicable.

D. Test reports and certificates as described in NFPA 13. Include "Contractor's Material & Test Certificate for Underground Piping".

E. Maintenance data for each type of fire protection specialty specified for inclusion in "Operating and Maintenance Manual" specified in Division Section "Project Closeout".

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose equipment, specialties and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.

B. Listing/Approval Stamp, Label or Other Marking: On equipment, specialties and accessories made to specified standards.

C. Listing and Labeling: Equipment, specialties and accessories that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in: National Electrical Code, Article 100.

D. Comply with requirements of authority having jurisdiction for submittals, approvals, materials, hose threads, installation, inspections and testing.

E. Comply with requirements of authority having jurisdiction for submittals, approvals, materials, installation, inspections and testing.

F. NFPA Standard: Equipment, specialties, accessories, installation and testing complying with the following:

1. NFPA 13 "Standard for the Installation of Sprinkler Systems".
2. NFPA 26 "Recommended Practice for the Supervision of Valves Controlling Water Supplies for Fire Protection".
3. NFPA 70 "National Electrical Code".
4. NFPA 231 "Standard for General Storage".

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

1. Back flow Preventers:
   a. Ames Co., Inc.
   b. Cla-Val Co.
   c. Conbraco Industries, Inc.
   d. Febco
   e. Hersey Products, Inc., Grinnel Corp.
   f. Watts Regulator Co.

2. Water-flow Indicators and supervisory Switches
   a. Gamewell Co.
   b. Gem Sprinkler Co., Div.., Grinnell Corp.
   c. Potter Electric Signal Co.
   d. Reliable Automatic Sprinkler Co., Inc.
   e. System Sensor Div.., Pittway Corp.
   f. Victaulic Company of America

3. Sprinklers:
   a. ASCOA Fire Systems, Figgie International Co.
   b. Central Sprinkler Corp.
   c. Firematic Sprinkler Devices, Inc.
   d. Gem Sprinkler Co. Div.., Grinnell Corp.
   e. Globe Fire Sprinkler Corp.
   f. Reliable Automatic Sprinkler Co., Inc.
   g. Star Sprinkler Corp.
   h. Viking Corp.

4. Grooved Couplings for Steel Piping:
   a. Grinnell Supply Sales Co., Grinnell Corp.
   b. Gustin-Bacon Div.., Tyler Pipe Subside,, Tyler Corp.
   c. Sprink-Line by Sprink, Inc.
   d. Stockham Valves and Fittings, Inc.
   e. Victaulic Company of America

5. Dry Pipe Valves:
   a. Tyco
   b. Reliable

   VICTAULIC DRY PIPE VALVES ARE NOT ACCEPTED.

2.02 PIPES AND TUBES

A. Refer to Part 3 Article "Sprinkler System Piping Applications" for identification of systems where pipe and fitting materials specified below are used:

1. Ductile-Iron Pipe: AWWA C115, ductile-iron barrel with iron-alley threaded flanges, 250 psig minimum working pressure rating and AWWA C104 cement-motor lining.

   a. Option: Pipe may be AWWA C115, ductile-iron barrel with iron-alloy threaded flanges, 250 psig minimum working pressure rating and AWWA C104 cement-motor lining.

2. Steel Pipe: ASTM A53, Schedule 40 through 6" and smaller and Schedule 30 in sizes 8" and larger, black and galvanized, plain and threaded ends, for welded, threaded, cut-grooved and rolled-groove joints.

3. Steel Pipe: ASTM A 135, Schedule 10 through 5" sizes and NFPA 13 specified wall thickness for 6" through 10" sizes, with plain ends, black and galvanized, for rolled-groove and welded joints.

4. Steel Pipe: ASTM A 135, threadable light wall, black and galvanized, for threaded joints (CCR=1.0 or greater).

5. Steel Pipe: ASTM A 795, black and galvanized, for joints listed and for use with fittings for plain-end steel pipe.
   a. Type: Standard-weight pipe, Schedule 40, for cut-groove, rolled-groove, threaded and welding joints.
   b. Type: Lightweight pipe, Schedule 10, for rolled-groove and welding joints.
   c. Type: Extra-lightweight pipe, thickness less than Schedule 10, for rolled-groove and welding joints.

6. CPVC Pipe: Blaze-master pipe SDR 13.5 ASTMA F 442

2.03 PIPE AND TUBE FITTINGS

A. Cast-Iron Threaded Flanges: ASME B1601, Class 250, raised ground face, bolt holes spot faced.

B. Ductile-Iron and Gray-Iron Flanged Fittings: AWWA C104 cement-mortar lining.

C. Cast-Iron Threaded Fittings: ASME B16.4, Class 250, standard pattern, with threads according to ASME B1.20.1.

D. Malleable-Iron Threaded Fittings: ASME B16.3, Class 300, standard pattern, with threads according to ASME B1.20.1

E. Steel Fittings: ASTM A 234/A 234M, seamless or welded, ASME B16.9, butt welding, or ASME B16.11, socket-welding type for welded joints.

F. Steel Flanges and Flanged Fittings: ASME B16.5.

G. Grooved-End Fittings for Steel Pipe: UL listed and FM approved, ASTM A 536, Grade 65-45-12 ductile iron or ASTM A 47 Grade 32510 malleable-iron, with grooves or shoulders designed to accept grooved couplings.

H. CPVC Fittings: Blaze-master fittings.

2.04 FIRE PROTECTION SERVICE VALVES

A. General: UL listed and FM approved, with 175 psig non-shock minimum working pressure rating.

1. Option: Valves for use with grooved piping may be grooved type.

B. Gate Valves, 2" and smaller: UL 262, cast-bronze, threaded ends, solid wedge, outside screw and yoke, rising stem.

C. Indicating Valves, 2 1/2" and smaller: Butterfly or ball type, bronze body with threaded ends and integral indicating device.

1. Indicator: Visual
2. Indicator: Electrical 115 volts a.c., pre-wired, single-circuit, supervisory switch.

D. Gate Valves, 2 1/2" and larger: UL 262, iron body, bronze mounted, taper wedge, outside screw and yoke, rising stem. Include replaceable, bronze wedge facing rings and flanged ends.

E. Gate Valves, 2 1/2" and larger for use with Indicator Posts: UL 262, iron body, bronze mounted, solid-wedge disc, non-rising stem with operating nut and flanged ends.

F. Swing Check Valves, 2 1/2" and larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze disc ring and flanged ends.

G. Butterfly Check Valves, 4" and larger: UL 312, split-clapper style, cast-iron body with rubber seal, bronze-alloy discs, stainless steel spring and hinge pin.

2.05 BACK FLOW PREVENTERS

A. General: ASSE standard back flow preventers of size indicated for maximum flow rate indicated and maximum pressure loss indicated.

1. Working Pressure: 150 psig minimum except where indicated otherwise.
2. Bronze, cast-iron, steel or stainless steel body with flanged ends.
3. Interior Lining: FDA approved epoxy coating for back flow preventers having cast-iron or steel body.
4. Interior Components: Corrosion-resistant materials.
5. Strainer on inlet where strainer is indicated.

2.06 SPRINKLERS

A. Automatic Sprinklers: With heat-responsive element conforming to:

1. UL 199 for applications except residential.
2. UL 1626 for residential applications.
3. UL 1767 for early-suppression, fast response applications.

B. Sprinkler types and categories are as indicated and as required by application. Furnish automatic sprinkler with "ordinary" temperature (155°F) classification rating except where otherwise indicated and required by application. All sprinkler heads must be quick-response.

C. Sprinkler types, features and options include:

1. Coated, painted or plated sprinklers.
2. Concealed ceiling sprinklers including coverplate.
3. Flush ceiling sprinklers including escutcheon.
4. Pendent sprinklers.
5. Pendent, dry type sprinklers.
6. Quick response sprinklers.
7. Side wall sprinklers.
8. Side wall, dry-type sprinklers.
9. Upright sprinklers.

D. Sprinkler Finishes: White, bronze and painted white.

E. Sprinkler Escutcheons: Materials, types and finishes for following mounting applications. Escutcheons for concealed, flush and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounted: White, semi-recessed.
2. Side wall Mounting: White finish, semi-recessed.

F. Sprinkler Cabinets: Finished steel cabinet and hinged cover with space for minimum of six spare sprinklers plus sprinkler wrench, suitable for wall mounting. Include number of sprinklers required by NFPA 13 and one wrench for sprinklers.

2.07 ALARM DEVICES

A. Alarm Devices: Types and sizes that will match piping and equipment connections

B. Water flow Indicators: UL 346, electrical-supervision type, vane-type water flow detector, rated to 250 pagi and designed for horizontal or vertical installation. Include 2 SPDT (single-pole, double-throw) circuit switches provide isolated alarm and auxiliary contacts, 7 ampere, 125 volts a.c. and 5 ampere, 24 volts d.c., complete with factory-set, field-adjustable retard element to prevent false signals and tamper-proof cover that sends a signal when cover is removed.

C. Pressure Switches: UL 753, water-flow switch with retard, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to operate on rising pressure and signal waterflow.

D. Supervisory Switches: UL 753, for valves, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to signal controlled valve in other tha full open position.

E. Supervisory Switches: UL 753, for indicator posts, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to signal controlled valvein other than full open position.

2.08 PRESSURE GAUGES

A. Pressure Gauges: UL 393, 3 1/2" to 4 1/2" diameter dial, with dial range of 0-250 psig.

PART 3 - EXECUTION

3.01 SPRINKLER SYSTEM PIPING APPLICATIONS

A. Refer to Part 2 of this Section for detailed specifications on pipe and fittings products listed below. Use pipe, tube, fittings and joining methods according to the following applications. Piping may be joined with flanges instead of indicated joints. Use grooved-end fittings with grooved couplings that are made by the same manufacturer and that comply with listing when used together for grooved-coupling joints.

B. Sizes 2" and smaller: ASTM A 53, A 135 or A 795, Schedule 40 steel pipe with threaded ends, cast-iron or malleable-iron threaded fittings and threaded joints.

C. Sizes 2" and smaller: ASTM A 795, Schedule 10 steel pipe, welding-type fittings and welded joints.

D. Sizes 2" and smaller: ASTM A 53, or A 795, Schedule 40 steel pipe with cut-groove ends, grooved-end steel pipe fittings and grooved-coupling joints.

E. Sizes 2" and smaller: ASTM A 53 or, A 795, Schedule 40 steel pipe with rolled-groove ends, grooved-end steel pipe fittings and grooved-coupling joints.

F. Sizes 2" and smaller: ASTM A 795, Schedule 10 steel pipe with rolled-groove ends, grooved-end steel pipe fittings and grooved-coupling joints.

G. Sizes 2 1/2" to 6": ASTM A 53, A 135 or A 795, Schedule 40 steel pipe with threaded ends, cast-iron or malleable-iron threaded fittings and threaded joints.

H. Sizes 2 1/2" to 6": ASTM A 53, A 135 or A 795, Schedule 40 steel pipe, welding-type steel fittings and welded joints.

I. Sizes 2 1/2" to 6": ASTM A 53, A 135 or A 795, Schedule 40 steel pipe with cut-groove ends, grooved-end steel pipe fittings and grooved-coupling joints.

J. Sizes 2 1/2" to 6": ASTM A 53, A 135 or A 795, Schedule 40 steel pipe with rolled-groove ends, grooved-end steel pipe fittings and grooved-coupling joints.

K. Sizes 2 1/2" to 6": ASTM A 135 or A 795, Schedule 10 steel pipe with rolled-groove ends, grooved-end steel pipe fittings and grooved-coupling joints.

3.02 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use gate, ball or butterfly valves.
2. Throttling Duty: Use globe, ball or butterfly valves.

3.03 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Grooved-End Pipe and Grooved-End Fitting Joints: Use grooved-end fittings and grooved couplings that are made by the same manufacturer and that are listed for use together. Groove pipe and assemble joints with grooved coupling, lubricant and bolts according to coupling and fitting manufacturer's written instructions.

1. Groove Type: Cut.
2. Groove Type: Rolled.

C. Dissimilar Materials Piping Joints: Make joint using adapters compatible with both piping materials.

3.04 SERVICE ENTRANCE PIPING

A. Connect fire protection piping to existing fire protection system as required by code. Provide new risers as required.

3.05 PIPING INSTALLATIONS

A. Coordinate the work of this section with other trades. Provide adequate space for installation.

B. Black Steel or CPVC pipe for all wet sprinkler piping. Galvanized Steel for all pipe on dry sprinkler piping.

C. General:

1. Provide listed back flow assembly at sprinkler system water source connection. Coordinate with local utility, conform to their installation requirements.
2. Install piping in concealed spaces above finished ceilings except in unheated spaces or attic spaces.
3. Provide seismic restraints per code, to be reviewed by structural engineer.
4. Riser: Provide two inches of clearance all around the fire main through the foundping shall be properly graded to drain to valve location.
7. No wet system pipes shall be located in any unheated areas even if they are proposed to be insulated. Any pipes installed contrary to this requirement shall be removed at the subcontractors expense.
8. On the Dry System Installation: The branch lines shall be pitched 1/2" per every 10 feet. The sprinkler mains shall be pitched at least 1/4" per every 10 feet.
9. The location of all drain down valves for the dry system shall be in a location accessible for maintenance and shall be on the first floor level in a common area, with valves not over six feet off of the ground, and not in a residential unit. Location of all drain valves shall be agreeable with the construction manager.
10. Install sprinkler piping with drains for complete system drainage. All drains must terminate outside building at a location approved by Architect, Owner and Construction Manager.

3.06 SPECIALTY SPRINKLER FITTING INSTALLATIONS

A. Install specialty sprinkler fittings according to manufacturer's written instructions.

3.07 VALVE INSTALLATIONS

A. Refer to Division 15 Section "Valves for installation of general duty valves". Install fire-protection specialty valves, trim, fittings, controls and specialties according to NFPA 13, manufacturers written instructions and the authority having jurisdiction.

B. Gate Valves: Install fire-protection supervised-open service valves, located to control sources of water supply except from fire department connections. Where there is more than one control valve, provide permanently-marked identification signs indicating portion of system controlled by each valve.

3.08 BACK FLOW PREVENTER INSTALLATION

A. Install back flow preventers of type, size and capacity indicated. Comply with plumbing code and authority with jurisdiction. Install air-gap fitting on units with atmospheric vent connection and pipe relief outlet drain to nearest floor drain. Do not bypass around back flow preventer.

3.09 SPRINKLER APPLICATIONS

Note: All Sprinkler heads are to be quick-response sprinklers.

A. Rooms without Ceilings: Upright and pendent sprinklers, as required.

B. Rooms with Suspended Ceilings: Semi-recessed sprinklers.

C. Wall Mounting: Side wall sprinklers, semi-recessed.

D. Spaces Subject to Freezing: Upright, pendent dry-type and side wall dry-type sprinklers.

E. Sprinkler Finishes: Use sprinkler with following finishes:
1. Upright, Pendent and Side wall Sprinklers: White in finished spaces exposed to view, rough bronze in unfinished spaces not exposed to view.

3.10 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels. First and Second Floor corridor and Third Floor where there is suspended ceiling must be pendent sprinklers with semi-recessed canopies. Third Floor corridor will be sidewall sprinklers with semi-recessed canopies.

B. Do not install pendent or side wall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers supplied from heated space.

C. Install sprinklers to avoid obstructions per NFPA 13 chapter 8.

3.11 CONNECTIONS

A. Connect to specialty valves, specialties, fire department connections and accessories.

B. Connect water supplies to sprinkler systems. Include back flow preventers as required on glycol connections.

C. Electrical Connections: Power wiring is specified in Division 16. Provide additional conduit and wiring to additional locations not shown on drawings.

D. Connect alarm devices to fire alarm system.

3.12 FIELD QUALITY CONTROL

A. Perform field acceptance tests of each fire protection system.

1. Flush, test and inspect sprinkler piping systems according to NFPA 13 Chapter "System Acceptance".
2. Report test results promptly and in writing to authority having jurisdiction when required.

3.13 CLEANING

A. Clean dirt and debris from sprinklers. Replace sprinklers having paint other than factory finish, with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.

3.14 COMMISSIONING

A. Starting Procedures: Follow Manufacturer's written procedures. If no procedures are prescribed by manufacturer, proceed as follows:

1. Verify that specialty valves, trim, fittings, controls and accessories have been installed correctly and operate correctly.
2. Verify that excess pressure pumps and accessories have been installed correctly and operate correctly.
3. Verify that specified tests of piping are complete.
4. Check that damaged sprinklers and sprinklers with paint or coating not specified have been replaced with new, correct type of sprinklers.
5. Check that sprinklers are correct type, have correct finish and temperature ratings and have guards where required for applications.
6. Check that potable water supplies have correct type of back flow preventer.
7. Check that fire department connections have threads compatible with local fire department equipment and have correct pressure ratings.
8. Fill wet-pipe sprinkler systems with water.
9. Energize circuits to electrical equipment and devices.
10. Start and run excess pressure pumps.
11. Adjust operating controls and pressure settings.

B. Coordinate with fire alarm system tests. Operate system as required.

C. Coordinate with fire pump tests. Operate systems required. Provide the original fire pump acceptance test curve from manufacturer and original installation.

3.15 DEMONSTRATION

A. Demonstrate equipment, specialties and accessories. Review operating and maintenance information.

B. Schedule demonstration with at least 7 days advance notice.

Reviewed for Code Compliance
Inspection Division
Portland, Maine
Date: 03/27/17

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